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TO: Internal File

THRU: Pamela Grubaugh-Littig

FROM: Sharon Falvey, Reclamation Specialist SKF
Robert Davidson, Reclamation Specialist RAD

RE: "K" Factor Analysis, Western States Minerals, J.B. King Mine, ACT/015/002

Purpose:

Compare RUSLE "K" values from drastically disturbed soils with published "K" values.

Background:

The soil erodibility factor "K" value is a numeric representation of the ability of the soil to resist erosion. Soils increase in erodibility as "K" becomes larger. "K" is independent of slope and dependent only on particle size and distribution, soil structure, and permeability.

Many existing mine plans are using "K" factors from insitu soils to make an erosion loss estimate for the reclamation phase. Often the soils replaced are manipulated and physically different from insitu soils. The result is a potential to have a soil erosivity or "K" value that differs from the insitu soils. Soils at the J.B. King site have been drastically disturbed and consist mainly of mixed overburden, weathered materials and soils obtained on-site or from local borrow. Therefore, replacement soils on site may differ remarkably from adjacent undisturbed native soils. Obtaining samples from reclaimed sites will give some idea of how K factors differ between disturbed soils and undisturbed soils.

Observations:

Three (3) surface soil samples were collected from the site at three separate locations. It was not the intention of this study to obtain statistically valid samples across the entire site, but simply compare several randomly collected samples to published values in the NRCS literature. Soil samples consisted of one spade, approximately ½ gallon size. The samples were placed in heavy duty zip lock bags.

On-site field observations and measurements included:

soil bulk density
soil texture
rock content
surface rock cover

In addition, the "K" factor determinations required laboratory analyses for the following:

% sand, % silt, and % clay for texture
% very fine sand
% organic matter
% moisture
Permeability

Results:

The three samples areas and "K" value results are listed below:

- Sample #1 - Refuse pile, new pocked surface at mid-slope, west southwest aspect.
- Sample #2 - Refuse pile, old non-pocked surface at mid-slope, west northwest aspect.
- Sample #3 - Reclaimed area directly east of weather station, northwest west aspect

	Mid-slope Refuse Pile	Northwest Refuse Pile	Weather Station
% silt, v.f. sand	39	20	16
% sand	43	55	49
% silt	28	25	27
% clay	29	20	24
Texture	clay loam	sandy clay loam	sandy clay loam
% organic matter	1.4	1.0	2.2
soil structure	fine granular	massive, hard surface crust	massive, hard surface crust
soil permeability (cm/hr)	4.5	3.9	12.1
Soil permeability class	moderate	moderate	moderately rapid
% coarse fragment	33	27	10
"K" factor	0.204	0.219	0.108

Published "K" values are listed for the J.B. King Mine general area[1]. The J.B. King Mine sits at the base of sandstone cliffs and escarpments and therefore, there is a heavy influence of sandstone based soils. However, soils at the mine site are heavily influence by Mancos shale. Sandstone based soils in the immediate area are listed with "K" values 0 to 0.10. Mancos shale based soils in the immediate area are listed as having "K" values 0.41 to 0.50. "K" values obtained in this study fall between these published values.

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[1]. Erosion and Sedimentation in Utah: A Guide for Control. 1984. Utah Water Research Laboratory, Utah State University.